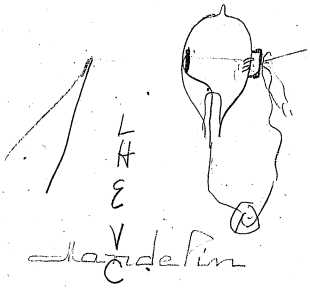
Notebook, N-91-09-03

This notebook covers the period September-October 1891. All entries are by Edison. The book contains notes and drawings regarding the "blue bulb" phenomenon and the reduction of mercury vapor in incandescent lamps. There are also notes on various filament experiments, including entries, numbered 1-19, relating to the deposition of carbon and other compounds on the filaments. Edison's notations indicate that he was often assisted by an experimenter named "Joe," possibly John Joseph Force. The spine is labeled "122." The book contains 187 numbered pages.

Blank pages not filmed: 178-185.

x E-172

N-91-09-03



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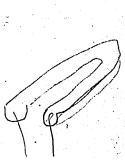
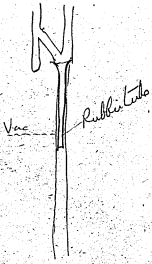


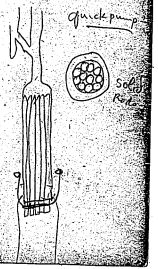
① Sept 3/91

deposit while getting Vac -

deposit filmen on inside Exhaust Tube after lamp sealed off this absorb Hg = vac Pt wire shunt to

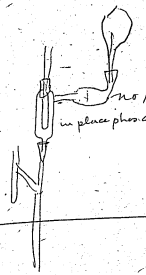
Sept 3/91

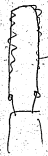




Sept 3/91

Nichols put in maximum ampoule & see if rise amp when lamp break –





gold & other metallic leaf on carbon which VAC bring fill up volatility + metal well in time absorb the Hg –

Sept 3/91

To ascertain if there is a Gas carrying shock off after Blue goes away also to ascertain if Lowering of CP after running rent due to great energy due to the shock = Red Lamp then measure Cold — then after it has fallen to 50 pc of CP measure again cold.

Sept 3/91 — 430 AM —

Put gold Leaf 1/2 inch sqr in Vac on glass where Vapor of Hg incandescent struck it By burning Lamp & looking at Blue by Spectroscope Hg lines grad nally disappeared twice rebel bring the Lamp higher than ever a 18 cp 240 was ever brot before Hurrah!!!

Sept 3/91 ⑦

The ~~old way~~ reason the old way was a failure was that it was put in side tube with idea it would absorb Hg where it dont absorb gold Hg but being put on side of globe or in the path of the incandescent vapor the instant the Hg strikes the gold it combines because its [redacted] incandescent. –

Sept 3/91

putting 1/2 inch equivalent of gold or Hg on side dont seem work well =

Sept 3/91

Phenomenon When gold leaf hung to fil the repulsed from globe when lamp touched, but when piece touches glass + off filament touching glass attracts force end to touching glass =

Sept 4/91

Hg Expo

- Iodide Hg in lamp =
Bring Hand Sodium amalgam -
Tin foil -

sept 4, 91

Keno. 32 = Seluor inside — Hg not gone
Set up Reg Curve -

Sept 4/91

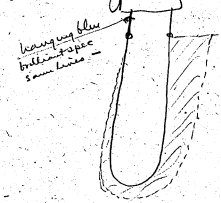
33 Keno - mg - side tube Iodide Hg
got vac above Hg - while on Vac heated
side tube not red or to decompose
gave off no air - then heated red
decompose potism Agl - no air
turned yellow reddish - stopped Hg
little sealed off with tube on
then heated till turned black
but check vac) sum = all lines
disappear globe clear - then sealed
off side tube - cut off tube

Sept 4/91

Keno 3# Mg Reg for Nobbler to put on transformer test but apparently Leg =

Sept 4/91

The Lamp with Cu I - gave off an no I = Knock Vac down hanging blue ||||| spec - globe apparently clear but by moving spec close to Carbon got this



Sept 4-91 (13)

33 No 2 is a duplicate - acts just same -

Sept 4/91

Keno 34 - Bromide Aurum

Lots other lines didnt heat, pldy Vac or
Carbon not (black lines) - high decompo, + lo globe clear blue
on clamp - High Vac - no Hg lines

Keno 35 - Chloride Aurum

(Cancel) Lots other lines Lots air on heating
Carbon very (right black lines) + our Vac + globe blue no Hg lines

Keno 36 Chl Aurum + Iodium

Lots other lines - Mod Vac globe blue -
(Carbon - black lines 1 side) no Hg lines -

Make Deathers Transform order

37 -

Sept 4/91

If getting rid of Hg Vapor prolongs life then best scheme is either Iodide salts put at tip. + heat to red when tiping — or a supply of Bromine gold between phos + lamp covered from light + when high Vac take off cover + expose to light long enough to give off free chlorine to combine with whole of Hg — or a side tube blocked and sealed off with lamp — or then exposed to light + sealed off — or small pieces put in lamp to keep Hg constantly combined during Exhaustion + piece afterwards ~~get down~~ left in or got down in Exhaust tube + sealed off; there are many schemes to work it — practical —

Keno 1 solids heated to 600 & then thrown in Naptha –

Keno 2 Reg clamp material all the clamp painted all over & heated

Keno 3 Aluminum Electrodes

Keno 4 new clamp material, chloroform Balata Benzol & plumbago painted over clamps clear down to glass –

Keno 5 Heated fil to 600 then thrown in Turpentine – then new clamp material all over clamps to glass –

Keno 6 – Bulb Coated made with amyl alcohol Sol of Collodion

Keno 7 - Inside globe coated with Rubber dissolved in Chloroform

8. Balsam Fir (Canada) in Benzol inside globe coated -

Keno 9 - globe cleaned with 25 pct solution HCl —

Keno 10 Cleaned hot 20 pct KO —

Keno 11 - Mg Carbon in gum bulb

6 X 10 sec
7 X 15 "
8 X 20 "
9 X 25 —
10 X slow chgs
11 X 3 inch Cock —

3 X 517
Ed - Cyhaindsfe

12 Keno Inside bulb coated Rosin in Benzol –

13 Keno – Bulb cleaned by ammonia

get missing 100 –

Keno 26 Sectional Exhaustion by pinch Cock –

Keno 27 – same as 26 but with Little bulb –

Keno 28 fine Contraction in Exhaust Tube –

Keno 29 Robinson plug

30 Reno accidentally —

31 Reno Carbon heated then thrown — hot HCl —

31 Extra same as 31 but bulb washed in HCl —

other nos in 1st part book =

Reno 23 big tube no carbon no glue on either clamp very leaky Gave 12/1000

22 Reno No photo used

21 Reno Run with photo like 22 —

Keno 20 Japanned clamp
+ part of glass –

Keno 19 – new clamp melted
in spots over filament.

Keno 18 – Long mode wires
japanned –

Keno 17 – Copper spiral on
N – side –

Keno 16 – japanned long
wire & glass – baked –

Sept 5/91 (27)

Keno 38 –
fits HCl. 10 hours –
Cold + not previously heated –

Keno 39 –
~~Tuesday~~ Tuesday
Sept 8 91 –

fels soaked 5 hours in test tube
3 stgx KO, then put in 1st distilled
water then soaked 1½ hours
in 2nd distilled water,

Keno 40 – Glacial acetic
5 hours – 2½ hours
in 2nd distilled – hard to wet
them –

Keno 41 -
SO_4 - soaked 5 hours
soaked 2nd Dist. 2 ½ hours

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42 Keno - Soaked Nitric acid 8 hours -
in 2nd Dist 24 hours -

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43 Keno - soaked 8 hours
in about 20 pct Hydriodic acid
in 2nd Dist. 24 hours

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44 Keno - 2 slix KO. for 5 hours about
afterwards tube put in hot KO water
& boiled about 2 hours until cooler
½ Evap. & bubbles gone, then 10 hours
in 2nd Distilled -

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35 — 33
3
10.5 — 99.

20 pot, 10.

Since we have good Carbons why not burn lamps at 60 candles for 20 min & then set them up at get drop cp at normal? Evidently we dont eliminate the excessive drop of Cp enough to prevent the 1st rapid drop at normal?

Try amalgamated copper clamps -

Try passing following in Ammonia bulb after lamp worked Rq -

HCl = Hydriodic acid, acetic acid, Nitric acid, Bromohydride, ~~Chlo~~ Nitro Benzol, ammonia, Hydrocyanic acid, Sulphide Carbon, Chloroform, Ethyl Alcohol, Sulphide ammonia, ~~Iodin~~ phenol, Trichloroacetic acid, Furfurol, pyridin, Bromoacetyl.

Dip Carbon in following —

Carbon in pyridin —

Uric acid in tetraethylammonium —

Halberg Nat in Mal,

Keno 45 = SO4 in water say 25% put inside globe when ready to Exhaust — Idea Going make globe acid — no curve yet

Keno 46 = Castor Oil in Lamp — yet no Curve

Keno 47 = Balsam Fir with Tetrachlorbon in bottom Exhaust tube —

Keno 48 – filo soaked in Ammonia 24 hours & several hours in 2nd distilled –

Keno 49 – Lead acetate 24 hours several hours 2nd distilled.

Keno 50 Borax 24 hours 12 hours 2nd distilled.

Keno 51 – 1 Lamp side tube fused Chl Cal big gun head 1/4 the size triangle – 1 drop SO4 when worked Lamp Reg. Knocked CaCl into SO4 – came off HCP – no blue – slots gas came off for 1/2 hour when not very bad lighted

Lamp this manner and gas 3 pol
ably moist - should pass through
phos anhy before going to lamp
burnt full bright in very bad vac
yet not oxidized = ~~Sec~~ finally
with very large quantity air
coming on sealed off

blue on clamp showed
Hg + some strange lines
plainly - also showed
Hg in good vac although
no blue in good vac -

Keno 52 - 24 hours in
phosphoric acid - 20 hours
in 2nd dist -

53 — fils 36 hours in
strong Chloride Sulphur
then soaked in Kerosene
1 hour —

12 X - after final quench, in
Kerosene - 10 sec of 17 -

13 X. same moulds not kerosened

14 X Regulus which FYH would
like tests in -

15 X are such as they are sending
to factory 10 sec of 17

16 X are discolored from tons which
they call oxidized -

~~53 Reno~~

53 Reno globes Req Mg dipped in distilled water containing say 1 to 1/2 % of H-Cl

54 = Req Mg - globe heated then H-Cl passed over gently until lamp - then cooled little by blowing on bulb - then reheated - + H-Cl passed again - blowed on - finger (red on end of exhaust tube) then taken off & rubber put on gently + then on pump

Keno 55 = Neck of bulb, tube & Ends in Ammonia bottle - dried till only little warm - put finger on & taken to pump room —

Keno 56. Clamps cleaned 1st HCl - 1/2 min then NO_3 5 seconds then Red Solution then plain water then distilled, but didn't wash whole length so glass got somewhat dirty by running water running down

57 – Mg wash bulbs –

58 Mg washed bulbs heated globes after Exhaustion + before sealing –

59 – Mg washed – bulb heated + run as high as possible on pump –

60 – Mg washed – peroxide head in side tube –

61 – Mg washed – 504 in side tube or 3 pin head ferro cyanide to make CO – 1st lamp broke ¼ end for pressure on pump making another –

62 – Mg washed – get Vac
plug in 120 Volts at once

63 – Mg washed plug in
on 120 ~~bottom of~~ 4th
peg down on Lamp bank
run 1/2 hour then throw out
Req –

64 – Reno – Req Mg
globe cleaned dried +
afterwards wet with
strong Sol KOI

Keno 65 =
Boric acid in glycerine

Keno 66 = Soaked about 3 days Chlor de sulphur then 3 days Kerosene

Keno 67. Soaked about 4 or 5 days in distilled water taken out & boiled on hot plate put back in water ~~[illegible]~~ ~~Soak in water~~ then out & sent to goz —

Keno 68 = Uric acid inside tube –

Keno 69 – SO_4 + piece Zinc knocked over into SO_4 to make H_2

Keno 70 – Mg Reg –
Sealed tube, then heat then in 15 min heat freeb again then after 25 min from sealed tube heat again then in 5 minutes light up fit + mg/c
Reg

Keno 71 = boiled for 1 to 1½ hours in strong KO; soaked 1 hour in Distilled =

Keno 72 = deposited by Aylsworth,

Keno 73 - Oxalate Ferrous in side tube - heated to reduce to blue then got solid tube worked Lamp + sealed off. = on one I attempted to reheat when it broke vac - destroyed the Lamp

Keno 74 — 10 Mg Reg
Kept fil on minimum time just enough each time to break tube.

Keno 75 = put Lamp on & then brought it up to yellow red heat for 2 seconds while there is no vacuum so as to Oxydize the filiments.

Keno 76 = Oxidized by passing through Bunsen burner

77 Keno - abt a week in strong HCl = taken out soaked dilut for 1/2 hour then Taken out dried sent to J.O.Z.

Keno 78 - boiled in ordinary Nitric several hours - (put in Carbon Cold) then boiled for Couple hours in fuming Nitric (may be nitrous)

Keno 79 = Carbon Cold put in Conc SO4 - heated over ~~water~~ sand bath - for say 4 hours - soaked 1/4 hour water

Reno 80 Cold Carbons in hot Cyanide K - for 4 hours

Reno 81 - Cold Carbons in hot Iodide K, for 4 hours

phenom - dont stick on taking out of water

Reno 82 - Cold Carbons in hot ChlZinc for 4 hours

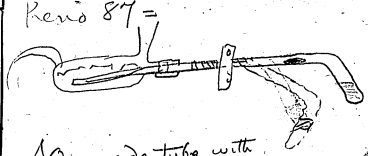
Reno 83 - Cold Carbons in Hot glacial phos acid for 4 hours

Reno 84 = Cold Carbons in hot Ferrous Chloride for _____

Reno 85 = Cold Carbons in hot Hydrogodic acid for _____

Reno 86 – Cold Carbon in hot Aqua Regia for _____

Reno 87 =



SO_4 in side tube with piece Ferrocyanide K by Tipping goes into SO_4 & make HCy after lamp worked both clamps & build heated lamp not run very high say 30 @ 40 cp. after gas in = 10 in order.

Reno 88 — same tube arrangement same process only Cyanide Ag giving Cy residual — 10 lamps

first worked lamp up Ag, then reversed poles — then got cooled tube, then put in Cy by heating AgCy tube, then put in heads — then sealed tube to 1/8 inch from heads — then sealed lamp off without lighting lamp — sealed off after Cy was in —

Sept. 14, 1891
was Monday
Sept. 16, 1891
was Wednesday
H.H.

Screen Eqpemnt started
Monday at midnight 14/91
now Wednesday mdnight
run continuous except
3 hours —

89 Reno 5 Lamps tube
got solid, then put 40
Lamps in series and cut
one at time out every 7
Seconds until 1st peg when
it was dull red — (Had heated
bulb by burner when solid
tube was obtained) then
worked Regular —

90 Keno Fluoride Sodium in SO_4
side tube —
No 1 had blue on clamp couldn't
get off
No 2 no blue on clamp —
Couldn't get clamp off no there
was acton on phos anhy

Keno 91 = Cold Conc SO_4
1 week Ocean boil for
3 hours — then taken out
Uranium in water & immersed
taken out dried & put
in box —

Keno 92 =
Drop SO4 inside outside
bulb — Mg Carbon —

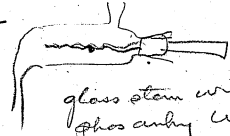
Keno 93 — Sodium amalgam
mixed and phos only worked and
looks like lime —
94 — Sodium — worked good
vac — 1½ @ 2 hour imperfect vac

95 — 90 deg Fret

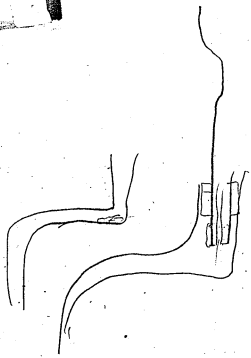
96 — 2nd Lamp sodium
only — wkd after 1 Belt
Ulan/NO1 = vac — how about
not perfect vac

97 – Sodium 3rd Lamp after Na had been in phos Cup all night = look about 50 minutes get solid tube = didnt break up very much when fel run up – I run it up to finish up – 3 minutes I noticed faint lines between Hg lines

98 –



glass stem with phos anhy works quite well –



Keno 99 —

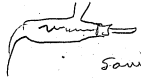
gas get heater

990 phos — works fairly quick except on tail end although it may

Gr 4K as Raj working gets solid tube quick at 1st

100 — 4th Lamp Sodium in phos tube —

101



Same as 98

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102 – ~~[illegible]~~ second Lamp heater –

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104 – Worked by Edison spoon phos Cup ~ ~~into~~ 2nd run on the phos – got sealed tube – put in plugs or run to full 120 volts second by second along box in 30 seconds or less – pulled pump or let run sealed – then lighted Exch again on 120 for 10. seconds pulled pump then run pump

104 –
Doled. then put on 200 Volts
+ run right up to blue off
clamps + pulled peg to let run
solid. then lighted Ure at
say 140 Volts for ~~5~~ minute
~~then~~ when found tubes cold
sealed off = noticed ~~[illegible]~~.
Every one that as soon as blue
off clamps running little bright
the blue disappeared in Cobe
on all + comes back on lower
Volts = Every one of 5 showed
this + this is new –
Notice on one leg of fil New clamp is dark
we put a paper spot on that side – which is the side clamp on

Possibly 3 run Ure Lamps two bright –

103 = New overall phos Cup with
spoon – 5 Lamps MZ Run Reg
1st run on the phos – Joe reports no
blue appears on clamps –

105 Reno –

Spoon phos Cup new –
phos MZ – pin head Hg in globe
worked up quick & minimum
time lamp on to get air out
plenty blue in globe – also
blue didnt go away like 104
blue on clamp went off not
quite like 104 but about
like Reg or little harder
Carbon shiny – economy
157 against 164 of 104 –
although both MZ Carbon

Lamps 3 and 2 that
~~didnt we looked 30 hour~~
other 90 hours all
broken on 90 hours
boys reports lamps kept always
blue –

106 ~ worked on heater + case

107 Reg Mg m. 50 cp bulb
Noticed that where bulb was
annealed one of the lamps
showed a streak of dew
inside globe at greatest
diameter - The Mg vapor was
so much that dew deposit
disappeared until nearly
mm Vac - then the bottom
spoon of phos was all
wet + while the other +
got sealed off + worked Reg then
with no blue or clump
the other lamp is still
in gth freq + there is no
end to our pbly due to H2O
decomposition of the wet phos
present absorb H2O

108 - 4 foot tube to diminish amount Hg vapor —

109 - dipd Cbt-dipichlo - not good dip but fair. 40 Lamp bank dident give off scarcely any air pbly dipd absbd phos & chlf decomp ch want to Hg C deposited — Arcd —

~~110~~ 110 Dup Heller one of 109 —

K-111 - Run up to about 4 Candles in Minimum vacuum glow freq 10 sec found Condut 90 higher sb had run freq sparking Exp not

112 Reno – Run up on Municipal & another 6.0x from nothing to 50 @ 60 cp – took about 3/4 hours no arc except at about 8 @ 10 c. when very fine pin heads after that way up scarcely the finest pin head showed – dont think I brought it up so high as they do reg as I was afraid would burn Carbon on account time it took – didnt have current off but arc for 5 sec at 8 @ 10 cp – Hg vapor lamp just came no flicker appeared

at Champs – 10 s at 1st then 15 then 1/2 minute then went by pin head & would if no pin heads & dim

put back to 10 sec & 5 minutes

112 No 2. 3 & 4 run same way (87)
notice shade of blackening on blue
clamp side near clamp 1/4 inch long
also notice glass of inside part
browned on blue clamp side & seems
to me all others have this brown on
u side glass — Dehydrated 330 without
dropped with [illegible] kerosene

113 - 5 fils dipd Cbt dipcchloro
old XXX —

114 = dip 17 - then ChlSul in
Kero 1/2 hour then in Kero
then to 302 = Lift 5324 hours
mg Carbon —

115 = dip 17 then ChlSul in
Kero - then in Kero alone out
dried then redip 17 then
ChlSul in Kero then in Kero
+ out —

Oct 11th 91

116 = Furnace Experiments

Amylen = Kerosene 25 mmls
which is yellow - Carbon box
non tube - very little Lamp
black - These Carbons are
NC Carbon on top of charcoal
nearest to where gas first strikes
& had some hairs in part
have been brushed off by
Camel hair -

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117 - same as above but
further on on top charcoal
towards exit.

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118 - ~~[illegible]~~ same as above
but immersed in 16 mesh
charcoal —

Reno 119 oct 1191

2nd Run Amylene but
Whitish yellow 1 hour and
non luminous flame – doesn't
seem as silvery as other in fact
don't notice they are any more
silvery than Regular's full
hairs which brushed off
pretty near all – Charcoal
was nothing may be if
I put Lamp black in each time
they Carbon or many dis better
possibly OX got in & Lamp blk
being organic stained Carbon
but Charcoal being more used
· bosomus meanwhile

oct 11/91

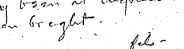
120 Run through Carb gas
didn't seem to be right

121 – used iron side tube
heated by burner side
tube have 8 or 10 grammes
Coal tar made them slightly
delivery ——

122 – Naphthalamine
this looks ok

didn't when Carbons much but
hard they been at impress and wanted
have been brought.

purpose



Oct 11 91

123 Naphthalene = ~~ug~~ no deposit dident send muff through going try send large quantity through most time.

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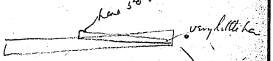
124 – It worked – Got cons shade together. Twas .50 volt shock on circle which was on top



gave gas somewhat deep ones to test full cp but shock they will be dull on top —

Oct 11.91

125 = Tan in 9mm retort.

slowed down lovely dident stick but shade - deposit very thin - wanted more time say 40 minutes next time -

5 set up month oct 17 hfr 3304

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126 - Same as above - but same stiff = not so good - 45 minute run -

4 set up 2 bkn 3.3.04

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127 = BS. Constop charcoal

→ 90 ⊃ practical deposit here

good very delicy - fundamentals nearly obliterated for 1/2 Carbon at ~~S~~ Loop functional from 90 good but at tall very slow but not so much deposit = had big retort, & was long time before sublimating 90 came thus towards end game (not wide 3" long

Oct 11 91 [illegible]

Luminous flame - had this been
kept up the deposit would have
been sufficient all over to eliminate
fund annuls - Evidently the 5/2
ones are either too high or they
refund qus - Rense Tails higher
drf that don't do its spread fits
out in various durations ~~to~~ do
fund out trouble =

Oct 12 91 7 [illegible]

Deport Experiments = Experiment 1

3 inch tube inside measurement.

Turnpoint for carbon - Big retort B.S.

Started 635 - with some little smoke coming out. at 652 the smoke lighted at 655 - turned on more gas alone on retort flame is now 3/4 long 1/4 inch of which is luminous at 7 pm 1 1/4 long 1/2" luminous - Big tube yellow 702 flame 2" long 1 1/4 luminous gently turned down gas alone slight to present too much flame a rapid deport 704 3" flame nearly all luminous slight appearance lamp blk at tip 710 still 2 1/2 @ 3" long slight lamp blk on tip 715 considerable lamp black - 719 shut off - found everything covered with lamp black - this was done in the start as no deport showed on carbon when they were bright - or circulation of gas too slow railroad ~~of~~ too rapid deport

Expmt 2 Oct 12 9/1 7.25

Same B.S in retort but mixed about 1/2 oz
Benzine to clear tube, there should have
been but a grammer as it made lots
much gas for considerable time

Started heat right away & put burner under
retort, flame appeared at 8.31 at once

Started 8.30 ⊕

Benzine vapor gave pulsating flame at
interval of 2 sec but when it was steady
turn was long at 8.34 like dull red
& benzine flame 3 inches long

8.35 very large. Benzine flame
~~yellow~~ bigger than gas jet smoky 8.38 flame 1/2
8.32 luminous smoky 8.40 flame
not smoky 1 1/2 long & luminous 8.42 Benzine
flame gone B.S flame Came 8.43 2 inches
long smoky & the yellow dust in cones
8.50 big as a gas jet smoky pulsating
turned off gas on retort at 8.53 when
flame at 8.54 led down to pin head & at
8.58 shut off gas from big burner

Carbons & holders all lamp black but
argus of deposit - fluffy & having
short weird filament on Sopat

Experiment No 3 Oct 12. 91.

New dose BS in large retort,
lighted retort about 1/2" flame at 955,
lighted gas in furnace at 957. -
958 - non inflammable air blowing
through exit tube 10.1 tube dull red.
raised flame in retort little, 10.4 tube
Red - non inflam air from exit at 10.4
raised flame in retort, 1007. non luminous very
pale flame at exit - 1019 tube yellow
flame self supporting 3/4 long blue colourless
non luminous 10 11½ pale flame 3/4 blue
non luminous - respirat in puffs little - jerky
1014 - 3/4 long above signs of luminosity -
Tube bright yellow - took top out carbon halo,
1016 - flame not long semi luminous not blue
no signs of volatilized particles in centre of
flame tube very bright yellow 1020 flame
inch long very luminous not blue, looks like
Alcohol flame with slight amount sodium - it
or say as top of alcohol flame
1023 very little tip of luminosity in
center of flame over exit.

Oct 12 91

Tube whitish yellow 1026½ pm - Exit flame about same size - luminous tip - cuber about ⅞ inch long - raised heat on retort

10,30 flame 1½ long ½ inch luminous no Lampblock no solid deposit.

1031 flame exit 2" 1¼" luminous

Tube bright yellow as I turned off little of gas on by luminous - 1032. turned gas way down on retort as Lampblock commenced to show - flame now dying down on 1 inch - luminous no Lampblock 1034 turned off gas on Retort, flame ¼ inch luminous

1035 Exit flame gone - 1036 shut gas off turned —

No Lampblock anywhere carbon very silvery but deposit light some fine fluff on them but not to harm =

Kerr 128.

from dry blow 1 finger

6 1/2 minutes blue flame appeared

7 minutes 1st appearance tiny non luminous flame –

9 minutes 3/4 inch pure blue

13 minutes flame not blue – wavy

27 tiny tip of luminous

31 minutes 2 long 1/4 of it luminous

32 3/4 luminous blackening lamp black

39 horrid

Expint 4 – Oct 12 · 91

~~Stopped this as No 3.~~ By retort

Put in a fresh dose of BS same amount by guess as before = I am going to work it as long Expint 3 as can but continue it longer to see if can get heavier deposit also turn burner more to stop fluffing –

lighted retort 1/2 5130 flame at 11 23 pm –

noticed at 11 25 non inflammable air coming from exit lighted furnace at 1126, exit tops on 1127 non inflam gas setting 1130 tube dull red scarcely any if any gas from exit raised flame on retort little – 1131 1/2 opaqty blank flame at exit 1132 1/2 raised flame on retort, now continue blue flame – 1133 first appearance tiny non luminous flame – 1134 tube dull yellow 1135 3/4 inch pure blue non lum flame little opaqty at times but continuous –

1138 – flame 3/4 inch non lum blue opaqty – when it sputts its still non luminous – about 6 inches long 1140 tube yellow

1141 flame 1/2 inch non luminous not pure blue but like top alcohol flame

1145 exit flame non lum but not blue 1/2 inch

1145 tube pure yellow look small

stop off –

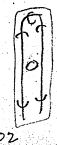
Oct 12 91.

1146 flame one inch not blue - non lum
1150 1/2 inch flame not blue non luminous
1150 raised flame on retort to full - 1153
slight tip of luminosity inside flame which
is 1 1/8 long - 1155 luminous point 1/8 inch
flame 1 1/2 long 1156 luminous point 1/4 long
1157 flame 2 long 1 1/4 luminous
1158 turned down retort more than 1/2
way 2/3 - flame nearly 3/4 luminous
with tendency to Lampblack on tip
by turning down flame shortens, 9
now raise it again but not full at the long
12 midnight = 12 flame about 1 1/2
long - 1/2 luminous 1/2 yellowish that being the
outside of flame 1203 - flame 2 long
little more than 1/2 luminous with Lampblk
tip slight although it doesn't deposit it on
top but down it flame 2 1/2 at 1204
& turn down retort little, tube bright
yellow & turn off little air + gas
1205 flame 2 nearly 3/4 luminous
yet great deal Hydrogen lines 2 Lampblack

making horns on tip flame -
1208 - flame 1 3/4 3/4 luminous very small
blue horns - tube bright yellow burned
off little air + gas - no sign yet off any
solid dust in center of flame - 1210
flame 4/5 - luminous faintest trace of
blue horns - about 1/2 inch from base flame
non luminous + only a faint yellowish outer
edge - 1212 horns disappeared - flame
resembles ordinary gas - Tube not quite
so bright a yellow but bright - 1215 flame
same - 1216 - flame same but sputter
little, tube bright yellow 1219 flame -
1221 - flame same except 3/4 long
+ sputtering - 1223 raised flame on
retort, 1225 flame 1 1/2 same characteristics
1227 flame 2" long same characteristics
no horns of blue - 1228 burned
flame out on retort 1231 burned
off gas from furnace flame at
least a pin head -

Oct 12 91

Turnpot filled at bottom with
Lampblack but carbon more solvent
than Expmt 3 with even less hairy
The deposit about ½ had the fundamental
at band but not on beg — none
struck = most of the lampblack was in
bottom of semicircle - eventually the
luminous band gone the lampblack
still ⊘ might have been due to
the extra bright yellow vanishing on
which that of hot tube at one
time, this temperature may have
decomposed hydrocarbon + gave
lampblk which would not have
decomposed if temperature had
been lower - as the band gets
most deposit we are going to
use a platt to retard flow of
gas just at filo



+ Arsto conduct
heat to filo bulb
by condctn + radiation

2 setup number 2802

Band 129

11 minutes 1st app tiny non lum
13 1/2 blue flame 1/2 inch long

Expmt 5 - Oct 12 91

1 1/2 of BS - [illegible] - plain tube pit -
big retort

Lighted retort flame about 1/2 flame
at 304 am - notice 305 non inflammable
air coming out slightly Lighted big furnace
at 307 combustible not inflammable coming
off 309 non inflam still coming 311 ditto
312 tube red, 312 non inflam still coming
314 reduced retort flame little. 316
first appearance of tiny non luminous
flame tube dull yellow at 317. pure
blue flame 1/2 inch long 317 1/2
319 - Tube pure yellow = I'm not going
to let tube get so hot this time
320 flame pure blue, 1/4 @ 1/2 - 322. much
long bluish not pure blue 324 - mauve.
1/2 inch long - tube bright yellow turned
off little air 1 qas - I will top burn off
3 or 4 minutes forgot to record time
326 - flame got small burned on more

flame or retard. 327. flame non lumino
top of alcohol lamp color horns flame 1 1/2
@ 1 1/4 long same trans but no lumino tip in
center at 328 1/2 — tube yellow. 330
semi lumino no lumino tip - 1 1/4 long
338 - non lumi no lumi tip flame 1/2 inch
385 knocked lamp block off ~~retard~~ flame now
inch non lum (1) semi ~~no~~ no lumino tip
no horns lumino ~~no~~ appear to
long at 336. at 337. flame 1 1/2 long tip
1/4 inch turned flame or retard some
some - 338 flame 1 3/4 lumino part 3/4
340 flame 2 inches with non lum border
one inch lumino no horns
tube yellow - 341 - same as it flame -
water tip to the lumo flame not equally
343 same flame - 345 same flame no
horns of lamp block - ~~stubbing~~ at non lum border
flame non lum 1/2 inch from 88 it -
flame 1 3/4 long 347 same flame but
less lumino

349 - 1 3/4 long about 1/2 non lum Oct 12 91
350 flame 1 3/2 long more than 1/2 non lum
tube pure yellow - 354 same flame
so far flame only sputtered out once + then
not bad. 356 - flame each 3/5 non
lum 4 am - flame 3/4 each 3/5 non lum
404 flame 3/4 - 1/2 non lum - tube
yellow - 404 turned off retort
flame - 405 flame 1/8 inch
for fear diminished heat on tube
while something is passing from
retort may give Lampblack
I keep flame on 2 minutes after
flame disappeared - flame dropped
407 - 407 turned off g no air
by retort. = all covered with
Lampblack - Carbons had been
deposited on but afterwards
Coated with Lamp black

Oct 12 '94

the plate is a failure as it gets covered with lamp black & pitch during the carbons, however I am going to leave the plate and try it again stopping as soon as luminosity shows itself

Exper. 6. Oct 12 91

20 oz BS 6 oz retort = platin turnoff — The increase from 12½ oz to 20 will give a longer non luminous flame as a proper stopping when signs of luminosity occurred —

5.05 Lighted retort full blast.

5.08 started furnace

5.12 Very not luminous the flame appears

5.13 " " " " 1/2 inch long

5.14 notice this blue flame is tipped with 1/8 inch luminous flame

5.15 flame 3/4 long 1/2 ~~of~~ which is luminous —

5.16 tube full red verging on yellow flame 1/2 inch long 1/2 luminous

5.17 - 1/4 inch " 1/2 "

notwithstanding ~~the~~ full flame from on retort

5.18 suddenly flame 3 inches long for 10 seconds. then goes to blue with inner 1/8 inch tip of

Oct 12 91

luminous flame 1 1/2 long then is at
519 — 521 3/4 nearly all non luminous
except 1/16 inch inner tip — 523 tube full
yellow — ~~Look top off~~ — 525 3/4 flame
narrow — no luminous tip ~~or~~ faintly
529 — flame 1 1/2 1/4 inner luminosity —
Shut off retort. flame 1 1/2
1/2 inch inner luminosity —
530 flame inch 1/8 inch inner luminosity
533 flame dies out, tube exhausted
yellow burned off ~~some~~ gas round —
535 burned gas off by furnace
scarcely any deposit —
handling any lamp black
through carbons brace
Some on
don't make Coke
no

Exp. nt 6. — Oct 12 91

started flame without fuel 11 58 am —

at 1202 started big furnace —

1210 — 1½ ~~@~~ 2 inch ½ & ½ Lumin

rosin lum — Lamp black

~~blo~~ Opinto smoky center to flame

white smoke — asculhalis

flame 1211 2½ @ 3 long smoky —

white center — flame size gas jet

red from excess smoke Tube

yellowish Red at 12 13 at 1214

flame bigr than gas jet awful bad

smoke from tips flame at

hole where red comes through yellow

smoke — Tar —

Immediately 3 inch flame

clouds lamp black blow

straight out — hard horse down

reduced flame 1/2 @ 13 at 1217 —

Tar dropping from exit tube

Oct 12 91

blowing strong spilling 1218
tube full yellow .. flame 4 inches
long round - Rusk dblk-lip -
foot dying down 1219 turned
up retard to full again - now
1221 blowing 4 inch flame -
Jar coming out tends stop hole
Sent shut off Relod 1225
flame 1½ smoky -
fils good elegant but all
hump blocks pobly subsequently
disposed

130 Pieces - Schumann Op. 6 for pf. 12 [illegible]
[illegible]
[illegible]

Experiment 7 – [illegible]
[illegible] 1010 – let in [illegible]
drops. B&W Bezel – at 1016
by [illegible] (cycles) at 1011
dull red – & let in up to [illegible]
[illegible] – shut down 1110
[illegible]
[illegible] dull cherry
[illegible]
cherry – no lamp blk showed on
turn rod when pulled up out
[illegible] 10.0 drops
in after 1015 =

No deposit Lois Lamp block
in bottom on nickel

Experiment 8 Oct 12 91

stained 1150 - runts which
yellow fuse det in 3 or 4 drops
4 times - stained with 6
drops in Gafon Lughly
at 1227 put in 4 drops flame.
tiny - but luminous except lit
10 minutes - 10 drops 12 30,

no deposit no Lamphlo.

131 Reno - oct 12 91

Regs dipd go then cg Chesul to pint
Reno soaked several hours &
then ran through regular
Carbon Bisulphide & washed
but very shiny & no hairs
from cloth -

Oct 12 91

Expt 9 – Small relay –
Cool Tar pitch – heated up relay
1 minute before lighting Furnace
started 4 15 – jerky blue
flame after 5 minutes –
no luminous flame at all
blows – jerky through whole
time stopped 4 47 – tube
always bright yellow
No perceptible deposit
on Carbon dome have just
shade Lamp Clock on nickel
bottom –

Exp'mt 10 – oct 12 91

Anthracene 1 @ 1½ oz Crude

Started 5 30 –

boiled –

We heated retort after 10 minutes too strong when suddenly lost over into hot tube + smoke lots gas + deposited Lampblack –

Experiment 12 Oct 13 91

Impure time in Florence flask in sand bath passed City gas through tube by lighting - then connected to flask gas ~~burner~~ stated furnace 1134 am - City gas is burning ~~[illegible]~~ 1/3 mile at 1140 at 1150 there is still gas now burning but this may be the Impure V supply - 1151 - Imp light Coil = flame [illegible] Imp burns Lamp like ~~[illegible]~~ red hot 1153 - tube reddish yellow 1210 shut off

No deposit or Lamp black - scarcely any Imp vapor through or at Condenser before it got to tube

Exp. # 11 = Oct 13 91

Lighted Relief of gas smoulering .852 psi - put 1/2 oz Hydro-Quinone in small retort, run for 1/2 hour - Lamp black deposited Carbon smoulder no deposit

Mg

Expmt 13 - Oct 13 91

Metachloral — retort started
retort + furnace 1007
stopped at 1041 -
no deposit no Lamp Black -

Experiment 14 = oct 13 91

4 oz BS boy reboil distilled retort
at 1257. stoked furnace at 1.01 p.m.
Exit blowing non inflam – tube
light cherry red am going to keep it at
this ~~=~~ slight amount inflam
gas coming 107 pure blue flame
water appeared alcoholic flame
now 1 13 – alcoholic except top remained
luminous. slight tending to bl
114 – now 2 1/2 inch luminous
flame tube cherry red
not light cherry slight dust
in center flame 2 1/2 a 3 long
luminous + lambblack –
tube bright cherry 119 –
136 stopped no deposit no lamblack

Oct 13 91

Expt 15 = 4 oz BS tube to be kept yellow or 7° ~ standard retort

236 pm = stopped 333

found Lampblack at ingress end on nickel and some Lampblack in form scales 3/4 rest on air test at Exit End where scales more dense

Carbons blocked.

Lampblk in Carb

no deposit -

Thus LBlk - Carbon shows LBlk deposited Low temp - the flame was always 1½ @ 1 3/4 long ½ luminous ½ non Lum at base

There was plenty Carbon hence of flame ½ @ 3/4 made in

Oct 13 91

hours run at deposits right for 56 minutes run there would be plenty Carbon -

Exper 16 - 4 oz BS -

going to run tube yellowish which I keep 1/2 @ 3/4 flame ~~with~~ 56 minutes -

Started 4 19 - passed City gas through - Lighted Retort City gas commenced 2 inches long burning after lighting furnace sloped 5 10, found nickel turned melted to iron or rather iron melted -

Expmt. 17 – oct 13 91

4 of BS big retort – new tube
Carbon box filled (10 mesh) carbon files
on top. made tube has non scale
+ in addition I put about 2
thimble full ferric oxide in fine
powder all over inside tube =
Started retort 1222 am –
Lighted furnace at 1225 am –
Exit tube blows considerable at 1225 ½
non inflam – at 1230 still blowing + non inflam
big tube very dull red at 1232 blowing + non inflam
big tube yellowish red – at 1235 blowing more but
not sufficiently inflam to self ignite.
1235 ½ inflam gas appears self lighting –
Absolutely not a faint deep blue flame ½ long
the Acetylene being 5/8 long I notice ½ mm
luminous tip. Big tube at 1240
Light orange yellow Took Crucible out.

Oct 13 9/

#241 base of flame $\frac{1}{8}$ long very blue flame
inch long inner luminous tip $\frac{1}{4}$ inch
outside yellow fringe – blue shows CO lines
in spectrum – 1248 tube whitish yellow
turned gas down flame 1/2 inch yellow
very little luminous blue base still there
raised heat on retort, the flame is yellow
& Na line is strong poly bz blue of burnt
for Na as CO lines show strong even where
the flame is yellow with Sodium 1253
luminous tip seems to have gone or is
masked by Na – flame now 7/8 long
$\frac{1}{32}$ blue base – tube whitish yellow
1255 flame $1\frac{1}{4}$ long very Na yellow
CO lines hazy blue base $\frac{1}{16}$ –
1258 flame 2" ($\frac{1}{4}$ inch blue base very
yellow – luminous inside $\frac{1}{16}$ long
1 am flame $2\frac{1}{2}$ long lum tip $\frac{1}{8}$
Blue $\frac{1}{4}$ inch – very yellow Na – CO lines
faintly strong 104 took flame away
from retort

105 Exit flame $\frac{1}{8}$ long — out 13.91 at 105 $\frac{1}{2}$ shut (ED)
gas off furnace No Lampblack
inside or on Cox no deposit on
Carbons Except few hairs on Carbon
nearest Exit —

Experiment 18
4 oz BS — 4 oz's —

Thimbleful of Ferric Oxide —
Lighted Retort at 134 $\frac{1}{2}$ Took light
away at 135 as there is good
non inflam blow. Lighted furnace
at 135 am — 141 flame not at all
lighting notice somewhat inflam
I am pulling light under & away
from retort so as Not to distill
off too much before big tube
gets yellow

Oct 13 97 (63)

145° tube yellowish Red - inflam gas
Out not self sustaining at 145° — at
149 - flame pulsating so it wont
remain lighted - tube yellow -
flame wld be self sustaining but
pulsating at 153 about $\frac{1}{4}$ inch
but blows at intervals - Very strong
heat on retort yet very poor
flame at first - yellow flame
Even when diluted dont notice
blue base but flame being only $\frac{1}{4}$
inch long poly wont show it
159 - flame already 5/8 $\frac{1}{32}$ blue
base - yellow - 2 air flam 1 $\frac{1}{2}$
blue base $\frac{1}{8}$ inch shimmer inside top $\frac{1}{16}$
flame yellow from Na CO spectrum

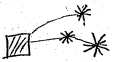
get 3 7/1
201 flame 2 inches long $\frac{1}{4}$ inch blue
base. Lum tip $\frac{1}{4}$ inch yellow Color from
Na – 202 – flame $2\frac{1}{2}$ long
3/8 blue base – 3/8 Lum tip yellow.
205 flame 3" 3/8 @ $\frac{1}{2}$ blue base –
inch Lum tip CO spec yellow. –
207 – 3" flame 3/4 Lum tip
base flame Manos like a some bluish
very strong flame on retort,
increased flame on retort at 210
flame at 5 x t $3\frac{1}{2}$ long manos
base 5/8 – Lum tip 5/8 yellow Na.
outside – CO Spec 212 suddenly
Tar came through or more poly
as drops were transparent
water flame full scale

- Oct 13 71

mass there is no doubt it was
water from reduction of Ferric
Condensed in long tube & then blown
out by gas ~~up~~ at 216 put
flame back under retort.
flame at first 1 inch - no
roaring tip no blue base - yellow
219 - flame 2 1/2 inches narrow
base 1/2 inch - dim tip 3/4
think Manganese color is pure blue
masked by the yellow -
at 224 removed heat on retort.
3" flame 5/8 blue of Manganese
color on base & 1 1/4 dim tip
flame yellow - Silk horns appear

Oct 13 91

230 – flame Little oscillating
3 @ 3½ long horns with silk –
inch ¼ lamp lip – 5/8 @ 7/8 blue
of manner but yellow no envelope
Shut off gas from reduct
230 — tube has been whitish
yellow right along – stopped at
232 — Carbons stuck
together somewhat silvery
but coated with fine hairs
with balls on ends of hairs
of still finer hairs



this way all over no lampblack

Oct 13 91 — (17)

now I think this phenomenon is due to electrification from heat + decomposition I am going to try it over again putting an upright in lieu of retort + connect to entry gas, then with Rubber ball + while retort is going give oscillatory waves to stuff from retort.

Experiment 19 — Oct 14th 91 ah then forgot

Big Retort. 4 oz BS —

still plenty ferric oxide O on probably in tube — Have Cock on between big tube & retort so we can pulverize the gas —
Lighted gas on retort. 420 —
Cock open — Got tube & broke off & made hole larger so large probably have to make it larger — sealed furnace —
424 so got blowing = was put flame on off Retort. so on to get Big tube to yellow — Since I knocked scale off big tube I can guess temperature better 432 flame inflammable but dont self sustain tube yellowish Red — flame self sustaining blue base & non

Oct 14 91

Lummus stopped at 5 o'clock AM

during whole time I opened
+closed Cock at intervals
of 10 15 + 20 seconds the
flame ~~and~~ when retort hot
shot out 6 @ 10 inches +
then suddenly died away to
2 inches then – second to inch
most time was a Lummus
inside top + when flame
returned from shooting inches
large quickly Lummus 5 or
3 @ 4 inches. Tube was
nearly all time bright
yellow somewhat ~~whitish~~.
This plan I think must
be OK = No deposit tube has
fluff no tiny flies
as before

started another
Book
Oct 14/91

TNE

(P)